

STATE OF ILLINOIS

Rivers and Lakes Commission

Bulletin No. 9.

CHICAGO, ILL.

July 31, 1912.

The Illinois
Water-Power-Water-Way

AN ATTACK BY
EBIN J. WARD

AND DEFENSE BY
ROBERT ISHAM RANDOLPH

Issued in Accordance with
Act of the General Assembly
Approved June 10, 1911.

STATE OF ILLINOIS

Rivers and Lakes Commission

Bulletin No. 9.

CHICAGO, ILL.

July 31, 1912.

The Illinois Water-Power-Water-Way

AN ATTACK BY
EBIN J. WARD

AND DEFENSE BY
ROBERT ISHAM RANDOLPH

Issued in Accordance with
Act of the General Assembly
Approved June 10, 1911.



SPRINGFIELD, ILLINOIS:
ILLINOIS STATE JOURNAL CO., STATE PRINTERS
1912.

WATER-POWER-WATER-WAY.

Mr. Ebin J. Ward, of Marseilles, Illinois, has circulated a pamphlet under date of January 15, 1912, entitled "The Illinois Water-Power-Water-Way—If constructed can the promises made to the people be fulfilled, and will its cost warrant the burden to the tax payers?"

Mr. Ward's attacks upon the State plan for the construction of a waterway between Lockport, Illinois, and Utica, Illinois, and the conservation of the water power in the DesPlaines and Illinois rivers have been numerous. To date no one has seen fit to challenge his statements, and I would fain let him enjoy his controversy by himself; but at the earnest solicitation of friends of the waterway, who imagine that his criticisms carry weight, I have undertaken to answer his arguments.

Mr. Ward is a resident of Marseilles, and his attacks upon the State waterway plan are not disinterested, as will appear from the following:

On March 9, 1867, the Legislature passed an Act to incorporate the Marseilles Land and Water Power Company under which this company was authorized to construct a dam not exceeding eight feet high above low water. It is alleged that this Act gave the corporation perpetual right to this privilege. In 1869 the Legislature amended this Act, and the amendment was approved March 27, 1869, providing that when the State shall take possession of the dam for navigation purposes the State shall cause a reasonable compensation to be paid to said Land and Water Power Company. At the time of the building of the dam the Water Power Company entered into a contract with the owner of the frontage on the south side of the river providing that in case the owner on that side should so elect he could, at any time, take one-quarter of the water in consideration of his frontage, the Water Power Company to maintain the dam in consideration of the other quarter in addition to their own half. The successor to the second party of this contract is Ebin J. Ward.

While it is apparent that Mr. Ward has had the right to draw one-quarter of the water and to use it for power purposes, he has not for some forty years taken advantage of that right. The right apparently did not seem to him a valuable one until it appeared that the State of Illinois might condemn this right for the purposes of a waterway.

Immediately after the failure of the Legislature to pass a waterway bill during the regular session of 1910, there was incorporated the Marseilles Hydraulic Company, certificate of incorporation for ninety-nine years issued on June 18, 1910. The object of the corporation is to "to acquire by lease or purchase or by lease and purchase water power and

water power rights; also to acquire by lease or purchase or by lease and purchase such real estate as may be necessary to the development of such water rights to be used in the development of hydro-electric power plants, such hydro-electric power when so developed to be leased, sold and distributed for lighting, heating and power purposes."

On June 30, 1910, two days after the certificate of incorporation was issued to the Marseilles Hydraulic Company, Ebin J. Ward, of Marseilles, executed a lease to this company of his lands and water rights in Marseilles, consisting of land lying south of the Illinois river at Marseilles, together with alleged water power and riparian rights, for a term of 99 years. Under the term of this lease, Ward is to receive rentals as follows:

\$1,000 for the first year; \$2,000 for the second year; \$3,000 for the third year; \$4,000 for the fourth year; \$5,000 for the fifth year; \$6,000 for the sixth year; and for each and every year thereafter \$6,000 per year. In Article 10 of this lease, the lessee is given an option to purchase this property at any time within ten years for the sum of \$125,000.00. The lessee is also given the right to dig a channel and erect a powerhouse on this property.

It will be seen, therefore, that certain alleged rights accruing to Mr. Ward; but which he did not attempt to enjoy for something like forty years, suddenly became immensely valuable. For some unaccountable reason the potential water power that had been neglected for forty years, one that is exceedingly difficult to develop on account of the necessity of a head race through an elevated country, became suddenly so valuable that Mr. Ward is enabled to sit back and draw a handsome income from the property without turning a hand. It is apparent, therefore, that Mr. Ward's attack upon the State plan for a waterway and the conservation of water power is not entirely disinterested. These facts must be kept in mind when regarding Mr. Ward's animadversion on the State plan.

I have outlined Mr. Ward's interest in the matter—permit me to explain my own.

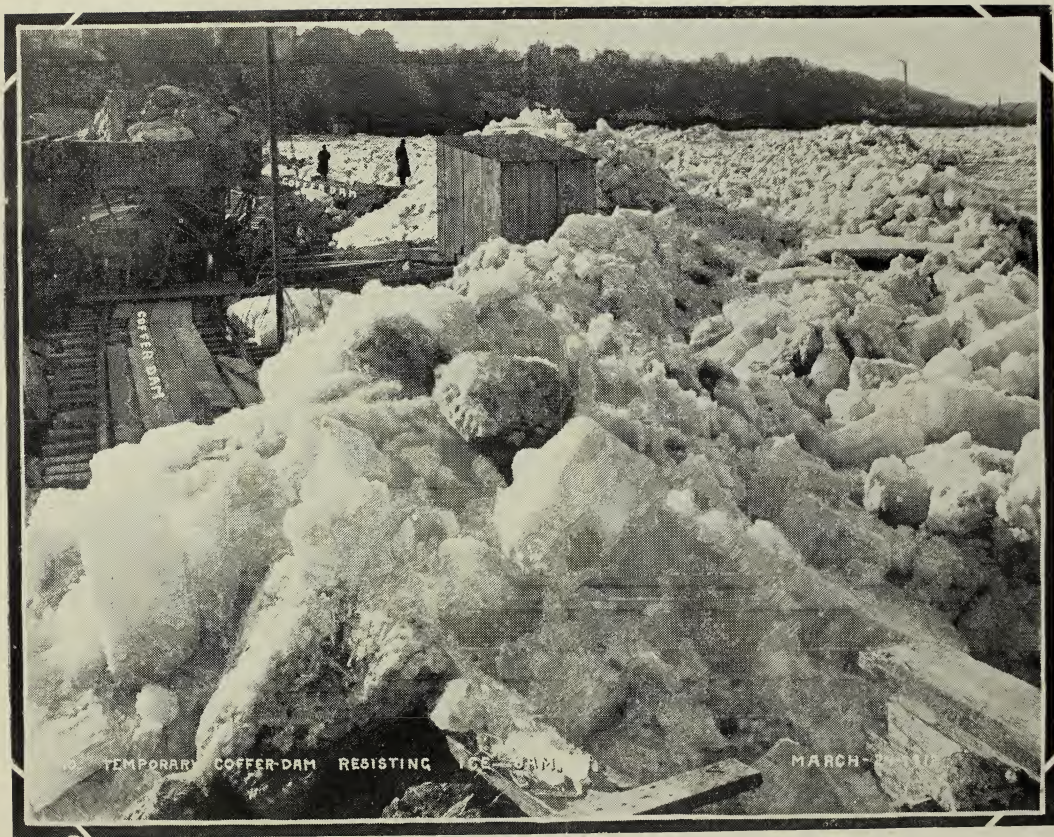
I am the Secretary of the Rivers and Lakes Commission of Illinois. This commission is charged with the duty of disseminating information with regard to the waterways in the State, and with the further duty of protecting the rights and interests of the public in these waterways. For this employment I receive what I believe to be a fair remuneration, and I have, moreover, an abiding faith in the feasibility, practicability and public good of the State waterway and water power project. My interest is tempered to some extent by the fact that I have an inherent distaste for controversy. Be that as it may, it now becomes my duty to defend this project at the instance of its friends, who are of the people and represent the people.

It has been charged that the so-called electric power trust has been circulating Mr. Ward's pamphlet and his arguments freely throughout the State. This may or may not be true, but in order to give Mr. Ward's pamphlet the same degree of publicity as my reply, I present herewith his attack and my defense in parallel columns:



Digitized by the Internet Archive
in 2017 with funding from
University of Illinois Urbana-Champaign Alternates

<https://archive.org/details/illinoiswaterpow00ward>



102 TEMPORARY COFFER-DAM RESISTING ICE-PRESSURE

MARCH 24, 1912

View No. 410—This view was taken March 24, 1912, on which date the ice in the river commenced to move. All of the ice shown in this view is being held back by the temporary cofferdam on the Iowa shore, the northeast corner of which is in the foreground. The cofferdam withstood this enormous pressure without sustaining any damage.

INCOME AND VALUES TO STATE.

Prior to the election of November, 1908, when a majority of the voters favored amending the State Constitution so as to permit the issuing of \$20,000,000 bonds for the construction of a deep waterway from Joliet to Utica, published statements lead the people to believe that the State was asked merely to lend its credit for a few years when the total expenditure would be returned to the treasury from the enormous income that would surely be derived from the use by the State of what it was claimed was in reality its own property, but which designing, unscrupulous men either had "grabbed" or were about to "grab."

One of these widely distributed circulars states: "if the entire net receipts, \$3,500,000 are applied, the bonds would be paid in eight years and two months. * * * The surplus earnings above that required to pay the bonds will be paid into the State Treasury to lessen the taxes of the taxpayers of this State." Another leaflet, of which over half a million were distributed by State officials, says: "The annual net revenue will, therefore, be \$2,500,000. * * * The bonds will be retired in fourteen years of operation, and, as shown by the foregoing summary, the entire issue can be retired with a net profit to the State of \$2,355,694.85. This presents the case in its most unfavorable aspect; and this is not all, for the property will continue to yield its perpetual yearly revenue of \$2,500,000 * * *." Other circulars of similar import were sent broadcast over the State and were backed by verbal statements of even tenor. In his message of November 6, 1907, Governor Deneen says: "It is estimated that the four power points between Joliet and Utica would produce 130,000 effective H. P. on the turbine shaft. The value of this power as a going concern is variously estimated at from \$400 to \$500 per horse power, or an aggregate of \$52,000,000 to \$65,000,000, * * *." The entire project is, therefore, of such a character that the cost of the works can be paid

I am constrained to amend Mr. Ward's statement as follows:

Prior to the election of November, 1908, when an *overwhelming* majority of the voters favored amending the State constitution. The vote upon the constitutional amendment was as follows: 675,898 For; 193,298 Against. It is true that published statements led the people to believe that the State was merely asked to lend its credit, not for a few years, but for twenty years. If these statements led the people to believe this, they were successful in their mission, for that is exactly what they were designed to do, and that is all that was asked of the people, all that is expected of the people, in this project, for we still believe and maintain that the total expenditure required to construct this waterway and conserve this water power will be returned to the treasury and that the bonds will be retired within twenty years.

We still maintain and affirm that the potential water power in this stretch of river between Lockport and Utica is the State's property. The only thing that makes it a water power is the artificial increment of flow from Lake Michigan sent down the DesPlaines and Illinois rivers through the Chicago Drainage canal constructed at the expense of the people. The statement that men—I hesitate to call them unscrupulous, but I do call them designing—had grabbed or were about to grab this water power, has been confirmed in the light of subsequent developments. It is seen that Mr. Ward and his lessees suddenly realized the enormous value of the property that had lain dormant for forty years and proceeded to develop this value.

The widely distributed circular referred to, making the wild statement objected to is qualified with an If. Unfortunately many wild and extravagant statements in regard to the proposed waterway and water power plan were made. I, personally, have heard spellbinders navigate battleships through Illi-

out of the revenue by the mere use of the credit of the State and without burden to the people." It was even claimed that all this in reality belonged to the State at that time, and that it was only necessary for the Legislature to rub Aladdin's lamp and, lo! an annual income variously estimated from \$2,500,000 to \$3,250,000 would perpetually flow into the treasury to "lessen the taxes of the tax payers of this State. Had not Governor Deneen in his message to the Legislature on Nov. 6, 1907, said: "The basis for the proposal to submit to the people this constitutional amendment was the ascertained fact that the resulting water power would more than repay the cost of construction of the proposed waterway, provided the State should preserve its undoubted right to the total water-power available along the line of the proposed waterway?" Commenting on Attorney General Stead's opinion in the Dresden Heights case, Governor Deneen in his message of Nov. 26, 1907, says: "If the State has no right to the water-power to be developed it is manifest that since the constitutional amendment was submitted on the assumption that the water-power would pay for the waterway, the invalidating of that assumption would greatly imperil if it did not entirely destroy the chance of its approval by the voters." With such glittering generalities set before them, no wonder the people sat up and took notice! No wonder the election was carried "for" the bond issue.

nois cornfields, but I do not believe that either Cicero's advocacy or Mr. Ward's antagonism wholly damn the project.

The leaflet, of which over half a million copies were distributed, is very familiar to me, as I wrote it and distributed it. The statements made therein are correct, and I still believe that the premises were and are correct. The only reservation I will make in regard to this pamphlet is that it presented the case in its most unfavorable aspect—that it was too conservative.

And that is not all, for the property *will* continue to yield its perpetual yearly revenue of \$2,500,000 more or less.

That other circulars of similar import were sent broadcast over the State I was aware. I was not aware that eight specially prepared and signed circulars and printed reports of many addresses were widely distributed in LaSalle county. I knew that the Hon. H. W. Johnson, then a member of the Internal Improvement Commission was advocating the project in LaSalle county, and I believed then and believe now that his advocacy was able.

It was claimed and it is claimed that the water power—the only constant and effective water power—belongs to the State because it was made possible by the constant flow through the Chicago Drainage Canal, which was built with the people's money. Reference to Aladdin's lamp suggests the remark that Mr. Ward has found a way to rub it so that it will produce a handsome income from alleged riparian rights that had produced him nothing in forty years.

The statement that a yearly income would perpetually flow into the treasury and lessen the taxes of the taxpayers of this State is not complete. This project would do more than that; its realization would furnish cheap power to the people of the Illinois valley who are now at the mercy of the power trust.

That the State should preserve its undoubted right to the total water power available along the

line of the proposed waterway made available by the artificial increment of flow through the Drainage Canal is still the contention of the State, and we question Mr. Ward's right, or the right of any riparian owner, to this benefit which was created by the public.

The fact that the voters did approve the constitutional amendment by an overwhelming majority is only proof that the people themselves believed they had a right to this by-product which they themselves had created.

That glittering generalities were offered the public is true; that flag waving and buncombe were general is true; but this line of talk was employed by both sides to the controversy and the defense has not yet discarded it.

It is in fact no wonder that the people sat up and took notice—no wonder that the election was carried for the bond issue. "You cannot fool all of the people all of the time," and when the great majority of them had sifted the truth from the bunk they went to the polls and protected their own interests.

APPROVAL OF VOTERS IMPERILED.

Since these power-sites belonged to the State, and since the State had the sole right to the use of the water flowing in the DesPlaines and the Illinois rivers, the State should at once take possession of its own and proceed to oust those who were alleged to be wrongfully trying to hold possession at Dresden Heights. Suit was started and our Supreme Court handed down a decision that the State does not own the right to use the water at Dresden. In this decision the court holds: "But if this transition is to occur—if the powerful hands of the government are to lay hold of this gigantic enterprise—they must do so with due regard to the sacred rights of every citizen, however humble and insignificant those rights may seem in contrast with the great public consummation."

Above the city of LaSalle, sections, townships and ranges cross

Mr. Ward cites the decision of the Supreme Court in the Dresden Heights case to the effect that the State does not own the right to use water at Dresden. It may not be generally known that this opinion was dissented from, but such is the case, and the suit has been carried into the United States courts. The Supreme Court of Illinois is not infallible; its decisions are not final and no man can say what the rights of the people at Dresden Heights are until the suit has been taken to the Supreme Court of the United States and a final verdict rendered.

The sacred rights of every citizen, upon which Mr. Ward discourses, have not yet been determined.

It is true that above the city of LaSalle sections, townships and ranges cross the Illinois river and that United States land patents

the Illinois river and United States land patents make the river the monument. The river front at Marseilles is on Section 24, T. 33 N., R. 4 E. of 3d P. M. and there are no reservations in the land patents; hence riparian owners take to the center thread of the stream. That the Illinois river above LaSalle is not *considered* navigable by the War Department and by Congress is indicated by recent reports of the former and by at least one recent act of the latter. That the perpetual charter granted by the State to The Marseilles Land and Water Power Company in 1867, as amended in 1869, and under and by virtue of which valuable property rights have accrued partakes of the nature of a contract between the State and the parties to whom the grant was made cannot be denied; and that the State is prohibited from passing a "law impairing the obligation of contracts" is equally clear.

Article 1, Sec. 10, Constitution of the United States.

Story on Constitution, 4th Edition, from Sec. 1392 (p. 253) to Sec. 1396.

Cooley on Constitutional Limitations, 3d Edition, p. 279.

Dartmouth College v. Woodward, 4 Wheat., 518.

Therefore, it is absurd to suppose, as has been frequently intimated is intended, that the State can destroy the dam and the large manufacturing interests at Marseilles, without paying the value thereof. The destruction of that property will cost the State millions of dollars. (See cuts showing dam and factories at Marseilles, pages 10-11.) According to Governor Deneen these conditions in conjunction with the above mentioned Supreme Court decision, greatly imperil if they do not entirely destroy the chance of the approval of the waterway scheme by the voters of the State, for the State must purchase every water-power site from Joliet to Utica.

made the river the monument. It is also true that these United States land patents made fractional quarters the monument; that the river was meandered, and that this meander is a monument to its navigability.

That the Illinois river above LaSalle is not *considered* navigable does not affect its navigability in law or in fact. The Ordinance of 1787, Article IV, defined the navigability of the DesPlaines and Illinois rivers thus:

"That the DesPlaines river, from the point where it most nearly connects itself with the Illinois and Michigan Canal to its source within the boundaries of this State, is hereby declared a navigable stream, and shall be deemed and held a public highway and shall be and remain free, open, and unobstructed from the said point of connection with the said canal to its utmost limit within this State, for the passage of all boats and water-crafts of every description."

The foregoing Ordinance was recognized by all of the Acts of Congress and all of the constitutions of the State of Illinois.

In 1837 the General Assembly of Illinois enacted a law declaring the DesPlaines river navigable from its source to its junction with the Illinois and Michigan Canal. The navigability of the stream at Marseilles is attested further by the Act which permitted the Marseilles Land and Water Power Company to build their dam. The navigability of the river in fact is attested by the fact that in 1844 a big side-wheel steamer, the "Superb" took a full cargo of produce from Morris, above Marseilles, to St. Louis, and it was generally understood that any boat which could go over the Hennepin Flats could come on to Marseilles if it wanted so to do.

The alleged perpetual charter of the Marseilles Land and Waterpower Company expressly says that the State may take possession of the dam, or remove it at any time, for improving the said Illinois river for the purposes of navigation. How this may affect the alleged right of perpetuity in the charter, or

whether the Legislature had any power to grant perpetual rights in a navigable stream, is immaterial, because under the State plan for a waterway we do not propose to take the Marseilles dam for purposes of navigation. We propose to go around it entirely. It has no function whatever in the development of the waterway or water power. The only way in which it will be affected is that it will be deprived of the artificial increment of flow from the Drainage Canal by the construction of another dam above it.

Whether the people or the Marseilles Land and Water Power Company and the Marseilles Hydraulic Company own this artificial increment is still to be determined.

If the right of people to this artificial increment of flow is determined, reference to the law impairing obligation of contracts is immaterial, and other references to the constitution, the Bill of Rights, the Magna Charta or the Lord's Prayer are equally immaterial.

If it is determined that the water power companies have any equity whatever in the artificial increment of flow from the Drainage Canal, it is not beyond the range of possibility that this equity can be transferred to the State plant at Bell's Island, and that the present operators of the plants at Marseilles would be glad to abandon their low head developments and receive a compensating amount of power from the State switchboard at Bell's Island.

That the State must purchase every water power site from Joliet to Utica, we do concede. We maintain that there are no water powers between Joliet and Utica that are worth the building of a dam, if they are deprived of the right of using the artificial increment of flow from Lake Michigan.

HORSE-POWER TO YIELD \$2,500,000 ANNUALLY TO STATE.

Bearing in mind the Governor's statement that the "constitutional amendment was submitted on the assumption that the water-power would pay for the waterway," and that the "invaliding of that assump-

We admit the statement that "the constitutional amendment was submitted on the assumption that the water power would pay for the waterway." Nay, more, we affirm it.

tion would greatly imperil, if it would not entirely destroy the chance of its approval by the voters," let us inquire into the physical conditions existing in the valley and ascertain whether the proposed State power-plants will produce sufficient electricity to annually bring to the State treasury the \$2,500,000 net the people were told would be theirs.

Regarding the proposed hydro-electrical development certain alleged facts have been officially published on the correctness of which rests the entire claim that even the first cost of the waterway will ever be returned to the State treasury. In order to realize the annual net revenue of not less than \$2,500,000, there must be, according to the report of the Internal Improvement Commission:

(a) A flow of 14,000 cubic feet per second from Lake Michigan.

(b) The heads under which the turbines are to work must be as follows:

	FEET.
Brandon's Road, Plant No. 1...	24
Big Dresden Island, Plant No. 2	18
Bell's Island, Plant No. 3	26
Utica, Plant No. 4	20

Total 88

(c) With the above attained it is stated by the Internal Improvement Commission that the water-power in the water column will be as follows:

	H. P.
Brandon's Road	38,182
Big Dresden Island	28,636
Bell's Island	41,364
Utica	31,818

Total 140,000

It is claimed that this will yield 100,000 electric horse-power on the switchboards, and that this can be leased at an annual profit to the State of at least \$2,500,000.

To determine the horse-power in the water column we have the formula: $H. P. = \text{cubic feet of flow per second multiplied by the head in feet multiplied by the decimal } 0.11363$. If in this formula 14,000 be substituted for "cubic feet of flow per second" and the head cor-

Let us, therefore, inquire into the physical conditions as they exist in the valley and ascertain whether the proposed State power plants will produce sufficient electricity to pay for the waterway.

The alleged facts, which have been officially published on the correctness of which rest the entire claim that even the first cost of the waterway will ever be returned to the treasury are easily verified. We are willing to stand by the statement and the tabulation of available heads and possible water power developments quoted by Mr. Ward.

We accept the formula presented by Mr. Ward for figuring horse power, and it is gratifying to have him check our arithmetic.

It is true that if the head under which the turbines work in any power plant be less than that assumed, the horse power in the water column will be less than that claimed, but it is true only for short periods. It is furthermore true that if a flow of 14,000 second feet, upon which we base our estimates, is not available the net annual revenue of \$2,500,000 will not materialize. It is also true that if this volume of flow is reduced to the 10,000 feet per second, which Mr. Ward seems to be willing to concede to us, that in round numbers 100,000 gross horse power will be developed, which will produce 80,000 horse power net on the switchboard and will return \$2,000,000 in yearly revenue to the State.

Therefore we are still able to show that the bonds will be retired within the time limit and that a net annual revenue of \$2,000,000 a year will redound to the credit of the State.

responding to each of the above power-plants, the horse-power claimed by the Internal Improvement Commission for each power-site will be derived. From the formula it is seen that if the constant flow of water, actually obtained, is less than 14,000 cubic feet per second, or if the head under which the turbines work at any power plant be less than that assumed, the horse-power in the water column will be less than that claimed and, therefore, the expected net annual revenue of \$2,500,000 will not materialize.

REQUIREMENTS OF THE UNITED STATES.

As to the probability of obtaining a constant flow from Lake Michigan of 14,000 second feet and, if obtained, at what cost to the State, may be seen from the following extracts from the report of the Special Commission of U. S. Engineers of which Brig. Gen. W. H. Bixby was chairman. This report was submitted to Congress on February 9, 1911, and is the one which has been widely spoken of as favoring the deep waterway plans.

"A careful examination has been made of the detailed estimates presented by the State of Illinois. So far as concerns the engineering features alone, such as excavation, construction of dams, locks, power plants, etc., the estimated cost is reasonable. The State's estimate, however, includes nothing for flowage damages nor for the purchase of water-power rights and franchises, and should the outcome of judicial proceedings now pending cause these damages and rights to assume great value, the State's estimate would then be insufficient.

"For purposes of navigation a diversion from Lake Michigan of less than 1,000 second feet of water is all that will be necessary. For purposes of sanitation the works of the Sanitary District of Chicago were designed to allow of 10,000 second feet and now contemplate a total of 14,000 second feet, the additional 4,000 second feet to be obtained by the diversion of water through the Calumet river and a

As to the probability of obtaining a constant flow from Lake Michigan of 14,000 second feet, the probability or possibility is mere conjecture. It seems to be conceded by all parties to the controversy that in any event the Sanitary District will be allowed to use 10,000 second feet and even with 10,000 second feet the water power proposition is feasible, practical and advisable. It is not to be assumed that the Congress of the United States, in which is vested the final authority in this matter, will permit the demands of special interests to overshadow the claims of two and one-quarter million people who have spent \$66,000,000 of their own money, not for gain, but for health and life. Moreover, if the Congress of the United States puts any restrictions on this flow which reduces its quantity to less than 10,000 second feet, then has Mr. Ward handed his lessee, the Marseilles Hydraulic Company, a gold brick, for with the natural flow of the river the water power at Marseilles would not be worth developing.

Mr Ward quotes the report of a Special Board of Army Engineers, of which Brig. Gen. W. H. Bixby was chairman, which was presented to Congress February 9, 1911. It is gratifying to note that this Board of army experts, after a careful examination of the waterway estimates presented by the State of Illinois, has found that the State's

connecting canal following the Sag route. The War Department, while awaiting the definite action of Congress, has so far permitted the diversion of 4,167 second feet and the Sanitary District is understood to be using 7,000 second feet. As the water which is at present being diverted from the lake appears to have already seriously affected navigation in its harbors and connecting waterways, prompt congressional action is recommended to limit the diversion.

"While it appears to have been assumed that the Sanitary District may be allowed to divert 10,000 second feet so long as actually necessary for sanitary purposes, the diversion of the waters of the Great Lakes from their natural outlet for power development alone is inadmissible, under the recent treaty between the United States and Great Britain. The future diversion of water from Lake Michigan for any purpose is fraught with difficulties. Not only has Canada an interest in the maintenance of lake levels which the United States must recognize, but every foot of water flowing through the Chicago Drainage canal lessens the flow at Niagara Falls and at the power sites along the St. Lawrence river, where due to the fall available, the same amount of water will create about four times the power that can be generated from it on the DesPlaines and Illinois rivers. The treaty enables riparian owners of Canada, as well as of the United States, who consider themselves injured by such diversion, to bring suit in the United States courts to protect their interests. The claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained. The treaty, however, recognizes as proper the use of water for sanitary purposes, and it is the opinion of the board that only such water should be diverted from Lake Michigan as is indispensable for sanitation, and then only with a provision for proper compensating works in the outlets of the lakes to prevent a lowering of their levels. Water thus diverted may be used incidentally

estimate includes nothing for flowage damages. Moreover, it reverses the Special Board of Army Engineers, which made a report upon a waterway from Lockport to Utica in 1905. This Board estimates the flowage damages for such a waterway at \$340,000, and the State's estimate for a waterway between Lockport and Utica contains the same estimate of cost for flowage damages. The State project will flood approximately the same number of acres as the project of the 1905 Board of Army Engineers. The State's estimate does not include anything for the purchase of water power rights or franchises, and neither did the estimate of the 1905 Board of Army Engineers. We still maintain and affirm that there are no water power rights which the State must buy to accomplish its project.

The statement of this special Board of Engineers that a diversion of less than 1,000 second feet of water is all that will be necessary for navigation purposes is disingenuous. This statement is made on the assumption of a slack watered river and provides for only the amount of water necessary to maintain lockage. It is pertinent to inquire how Mr. Ward himself would like to have the flow reduced to the 1,000 feet per second suggested by the Special Board of Army Engineers. Does his contract with the Marseilles Hydraulic Company insure his handsome income to such an extent that he is careless of the amount of water which it is permitted to use?

It is significant that this Special Board of Army Engineers makes the statement that the water, which is at present being diverted from the Lake, *appears* to have already seriously affected navigation in its harbors and connecting waterways. This insidious statement is made time and again, and neither the Army Board nor anybody else appears to come out and make the flat statement, that the water diverted through the Drainage Canal has seriously affected navigation. Under the direction of the United States Engineer Corps, and by or-

for power purposes, but care must be exercised in authorizing the diversion of water for sanitary purposes, to restrict it to the amount necessary for those purposes alone.

"Until it obtains further data the board defers its report upon the measures required to properly preserve the levels of the Great Lakes and to compensate so far as practicable for the diminished level in such lakes by reason of any diversion of water from Lake Michigan * * *."

The above report of the special board was submitted to the Board of Engineers for Rivers and Harbors, as required by law, and the report of this board contains, among other things, the following:

"In conclusion it is recommended that the work proposed by the special board for the United States in the Illinois river be not undertaken until the Secretary of War has received satisfactory assurance from the State of Illinois that the State will build that portion of the waterway from Lockport to Utica without cost to the United States, and in accordance with plans to be approved by him; and, further, until the interests of the United States have been satisfactorily safeguarded as indicated by the special board, viz., that the State of Illinois or its agencies shall assume entire responsibility in perpetuity for all damages by changes in lake levels incident to the work, including cost of compensating works and for all damages to riparian owners along the proposed waterway from Lake Michigan to the mouth of the Illinois river, and that the State shall transfer to the United States the locks and the control of the new waterway thus created so far as needed for navigation, and the locks and dams at Henry and Coperas creek on the Illinois river."

Our treaty with Great Britain considers Lake Michigan an international body of water. In fixing the uses of water which may be drawn from the Great Lakes, this treaty contains the following clause: "The following order of precedence shall be observed among the various uses enumerated hereinafter for

der of Congress, work has been done in the interlake channels which has caused a reduction of lake levels vastly greater than has resulted, or ever can result, from the work of the Sanitary District of Chicago. Moreover, the treaty with Great Britain sets forth in no uncertain terms the use for which water may be taken, and in giving the order of precedence it presents, first, the use for domestic purposes, and after that the use for navigation. As the treaty gives precedence to the requirements of the Sanitary District and as it is clear that the increased flow caused by deepening of interlake channels for the benefit of navigation has not the prior claim, it will not avail the Army Board, or anybody else, to cast the aspersions upon the Chicago Drainage Canal that it has lowered the lake levels.

The Army Board says: "While it appears to have been assumed that the Sanitary District may be allowed to divert 10,000 second feet so long as actually necessary for sanitary purposes." The assumption seems to be borne out by the terms of the treaty with Great Britain. The Army Board says further that the diversion of waters of the Great Lakes from their natural outlet for power development alone is inadmissible under the treaty, but the treaty allows 36,000 cubic feet per second to be taken for power purposes alone on the Canadian side, and 20,000 cubic feet per second to be taken for power purposes alone within the State of New York. The use of lake water for power and irrigation purposes comes third in the order of precedence defined in Article 8 of the treaty. If, therefore, 86,000 cubic feet per second of lake water is to be allowed by the treaty for the use in water power development alone what power is there to deny to the people of the commonwealth of Illinois their primary right to use 10,000 or even 14,000 cubic feet a second for domestic purposes?

We will quote from the report of the Special Board of Army Engineers to the effect that "every foot of water flowing through the Chi-

these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence:

"1. Uses for domestic and sanitary purposes.

"2. Uses for navigation, including the service of canals for the purposes of navigation.

"3. Uses for power and for irrigation purposes."

Now note what the government engineers said: "For purposes of navigation a diversion of less than 1,000 second feet of water is all that will be necessary." And again: "The claim that more than 1,000 cubic feet per second is required for purposes of navigation can not be maintained." Therefore, under the treaty the amount of water that can be used at the State's power-plants will be limited to that which is actually necessary for sanitation. At the present rate of flow through the Sanitary Canal 14,000 second-feet will not be needed for sanitation until Chicago has a population of nearly 5,000,000.

For the return to their treasury of the \$20,000,000 they are asked to spend, are the people to depend on a flow of 14,000 second feet from Lake Michigan, that is so far in the future, or, in order to assure that flow at once, will the State assume in perpetuity all the obligations required by the United States? The treaty with Great Britain opens international questions. Is it expected that Congress will require less of Illinois than the War and the State Departments maintain is just and proper or less than will constitute performance of our treaty obligations? If it is shown that the withdrawal of 14,000 second feet from Lake Michigan affects navigation in the harbors and connecting waterways of the Great Lakes (and the U. S. Engineers indicate that even the present flow is doing so) will not the Lake Carriers' Association compel Illinois to "do business" or shut off the flow? Is Illinois ready to pay the price (including the maintenance of lake levels by the construction of compensating works at Niagara and

Chicago Drainage Canal lessens the flow at Niagara Falls at the power sites along the St. Lawrence river." This is a most significant statement—mark it well—for here is the source of the strenuous opposition to the Illinois Waterway Water Power. This is where the shoe pinches the water power trust. Are we to assume that the claims of these vested interests are paramount to the claims of the commonwealth of Illinois and that portion of her citizenship that must purify its sewage and protect its drinking water supply by an adequate volume of flow through the Chicago Drainage Canal?

Again we find the statement that the "claim that more than 1,000 cubic feet per second is required for purposes of navigation cannot be maintained." Again I say that the statement is misleading—I would hate to believe that it is purposely misleading—but it should be qualified by a statement of the fact that here the Board of Army Engineers means that 1,000 cubic feet of water per second is all that is needed to supply water for lockage in a slack watered river between Lockport and Utica.

Referring to the report of the Special Board of Engineers on a waterway from Lockport to St. Louis, published in 1905, on Page 6 under the caption of "Vested Rights," I find that *"The Board does not condemn the present plan of taking 10,000 cubic feet per second, believing as it does that some such amount will be needed to protect the lives and health of the people of a great city and of a populous valley."*

The Special Board of Army Engineers, which reported to Congress on February 9, 1911, is doing an unprecedented thing in repudiating this part of the report of the 1905 Board.

It is comforting to note that the treaty with Great Britain "recognizes the proper use of water for sanitary purposes." It would be more enlightening, however, to state the fact that Article VIII of the treaty, which clearly defines the use for which water may be



Illinois river at Bell's Island—Site of a proposed State power-plant at a time when during nine consecutive weeks not one of the total of 73,132 horse power, claimed as constant at Bell's Island and Utica, would have been produced.

COPY OF AFFIDAVIT ATTACHED TO ABOVE PICTURE.

MARSEILLES, LASALLE COUNTY, ILLINOIS.
June 12, 1911.

I hereby certify that on the fifth day of March, 1903, I personally took the photograph to which this affidavit is attached, that in the taking of said photograph my camera was leveled with a spirit level, that the lense used was of normal focus, that the camera stood on the left bank of the Illinois river opposite Bell's Island, about two and one-half miles below the highway bridge across said river at the city of Marseilles, LaSalle county, Illinois, that the line of sight was in a direction north of westerly, that Bell's Island may be seen in the picture on the right and right-center and that the right bank of the Illinois river may be seen on the extreme left of the picture.

(Signed) C. R. ARNOLD.

Subscribed and sworn to before me this 12th day of June, A. D. 1911.

(Signed) W. A. MOREY, JR.,
Notary Public.

[NOTARIAL SEAL]

near Detroit) in order to secure a flow of 14,000 second feet from the Great Lakes to power-plants along the DesPlaines and Illinois rivers? And yet, if the flow to the State's power-plants falls short of that figure, the annual net revenue to the State treasury will fall proportionately below the \$2,500,000 claimed. Were the voters of Illinois fully cognizant of these conditions when they voted "for" the amendment of the Constitution on November 3, 1908?

taken, gives in the order of precedence, first the use for domestic purposes. It is deplorable that an attempt should be made over and over again by any governmental authority to foist upon the Sanitary District of Chicago the obligation to build "proper compensating works in the outlets of the lakes to prevent a lowering of their levels." I find no word to characterize it when it is considered that the work done in the interlake channels under the direction of the United States Engineer Corps and by order of Congress has caused a reduction of lake levels vastly greater than has resulted, or ever can result, from the work of the Sanitary District of Chicago.

My ire is still further aroused by the insidious repetition in this paragraph of the same insinuation in which the Board suggests remedial works "for diminished level in such lakes by reason of any diversion of water from Lake Michigan." The Board nowhere makes its acknowledgement of the fact that the improvement of interlake channels has affected lake levels, and when it does not make the open statement that the Sanitary District is alone responsible for diminished lake levels it makes the same insidious insinuation. As a matter of fact, the Board has not yet successfully demonstrated that there is any lowering of lake levels.

Here the Board reaches the climax of its audacity when it makes the statement that "the State of Illinois, or its agencies, shall assume entire responsibility in perpetuity for all damages by changes in lake levels incident to the work, including the cost of compensating works." This is a culmination of all the attempts to foist the results of work on the interlake channels upon the Sanitary District of Chicago and the State of Illinois.

Not only that, but here again the attempt is made to saddle upon the Sanitary District all claims for damages by reason of overflow in the Illinois river alleged to be caused by the construction of this waterway, notwithstanding the fact that the construction of this

waterway will not increase overflow damages to riparian owners along the Illinois river one iota. The slack watering of the Des Plaines and Illinois rivers between Lockport and Utica will not to the slightest extent affect the volume of flow or the acreage of lands overflowed in the lower Illinois. The volume of flow will not be increased one drop by constructing locks and dams in the upper river, and suits for alleged overflow damages have no more bearing upon the construction of a waterway between Lockport and Utica than a suit for the annulment of a marriage decree in Reno.

The statement that "under the treaty the amount of water that can be used at the State's power plants will be limited to that which is actually necessary for sanitation" is one that is extremely gratifying to us. The present flow through the Chicago Drainage Canal is entirely inadequate for the proper dilution of the sewage that enters it. In fact today an amount of water something like 10,000 feet a second is necessary to properly dilute the sewage that now goes into the channel, and the time is not far distant when the channel will be taxed to its utmost capacity and its ultimate flow of 14,000 feet a second will be required to properly dilute the sewage. The conditions today are so bad that they are the subject of complaint made to the Rivers and Lakes Commission, and the Rivers and Lakes Commission is endeavoring to get the Sanitary District of Chicago to install sewage purification works.

I take issue with the statement that at the present rate of flow through the Sanitary Canal 14,000 second feet will not be needed for sanitation until Chicago has a population of nearly 5,000,000. For years the Calumet district, the vast region south of Englewood, has been calling for relief from the intolerable condition of nuisance that exists on account of its inadequate sewage disposal facilities. The outlying districts north and west of Chicago are even now suffering from a condition of intolerable nuisance caused by their

inadequate sewage disposal facilities. Most of this territory is not within the municipal limits of the Sanitary District, but all of it is tributary to the Sanitary District and these people have a right to the relief that can be afforded them by the Sanitary District of Chicago.

The introduction of the Lake Carriers' Association into this argument presents another powerful vested interest which is fighting the public interests of the commonwealth of Illinois. It cannot be shown that the withdrawal of 14,000 second feet from Lake Michigan affects navigation in the harbors and connecting waterways on the Great Lakes. This phase of the discussion is ably discussed in Rivers and Lakes Commission Bulletin No. 6. I will not enlarge upon it here for it is already in print. I respectfully refer my readers to this Bulletin.

Have things come to such a pass that the desire of corporate greed to secure a large interest on its investments is superior to the claims that two and one quarter million people have upon the use of their investment of \$66,000,000 made for health and life?

Here again we find an attempt to foist the cost of compensating works required by the increased flow through interlake channels upon the Sanitary District of Chicago, and I beg leave to quote just one paragraph from Bulletin No. 6:

"But why discuss any such proposition at all in view of the report of the Board of Government Engineers that remedial works at the east end of Lake Erie will restore navigable depths at a cost of only \$796,923, and when it is further demonstrable that a proper control of the waters of Lake Superior by works now installed will remedy the whole evil? It may be urged that the existing works are inadequate, but it cannot be denied that they can be made adequate by a very inconsiderable additional expenditure. As to the propriety of Canadian and United States governmental advice to a city in any state of this Union as to the manner in which it shall dispose of its

sewage and conduct its municipal engineering, I must leave the people of the several states to express their opinions."

ACTUAL VS. CLAIMED HEADS ON WHEELS.

Now as to the actual head that will be obtained on the turbines at the proposed State power plants. For the time we will assume that there is a flow of 14,000 second feet from Lake Michigan and will consider only the heads under which the flow can be used.

The Internal Improvement Commission says that the estimate of a total head of 88 feet is the effective head at low water. That is, it is the greatest head to be obtained at the power sites at low water periods. If at any time the actual heads obtained at the various power sites are less than those assumed, the net annual revenue will be proportionately reduced, unless the decrease in head is compensated by an increase in cubic feet of flow per second. No increase in quantity of water beyond 14,000 second feet is expected from Lake Michigan, hence it is only from the water-shed that such increase can come. That it is expected that flood stages will affect injuriously the head at Utica (and therefore the power obtained) is admitted by the Internal Improvement Commission when it states: "The Utica power will always be affected by flood conditions in the river below, but extreme floods are exceptional, and radical improvement in the Lower Illinois should better these conditions. At low water the head will be twenty feet, but this should be increased by river improvement to twenty-six feet." To add at low water stage, six feet of head at Utica by "improvement in the Lower Illinois," where there is a natural low water slope of less than 30 feet in 220 miles, would indeed require "radical" work, and how could that additional six feet of head be maintained at all times when at the mouth of the Illinois the water of the Mississippi has been known to rise to a height exceeding the total low water slope in the Illinois from its mouth to La-Salle, so that in the natural condition of the river the water of the

Mr. Ward states that the Internal Improvement Commission says that an estimate of a total head of 88 feet is the effective head at low water. It is gratifying to find the Internal Improvement Commission quoted correctly in this instance. This estimate assumes that 10.4 feet out of a total head of 98.4 feet will be consumed in slope, back water and other impediments to flow, and that the effective head will be 88 feet at low water.

His statement that "if at any time the actual heads obtained at the various power sites are less than those assumed, the net annual revenue will be proportionately reduced unless the decrease in head is compensated by the increase in cubic feet of flow per second." This is almost true. It is a fact that if the heads are reduced by back water, that the amount of power available will be proportionately reduced. Any increase in the flow, however, would have the effect of increasing back water conditions.

It is not claimed that the power at Utica will not be drowned out at times.

In fact the statement of Mr. Lyman E. Cooley, which Mr. Ward quotes, to the effect that the power plant at Utica will be drowned out in flood and that at such times the other three plants must be made to carry the load of the Utica plant is true. It is not true, however, under the plan of the Internal Improvement Commission, that the plant which is below Dresden Heights will be drowned out in flood. Under our plan the head race is carried down stream in a raised channel far enough to be beyond the effects of back water.

Referring to the photograph of the ice gorge in the Illinois river at Bell's Island with the formidable affidavit attached thereto, I remember that this same picture and affidavit were exhibited at a hearing before the Committee of the Whole in the House of Representatives, and that the photograph

Mississippi will materially affect the elevation of the water surface of the Illinois at Utica? Mr. Lyman E. Cooley says: "The two sites at Dresden and Utica will be practically drowned out in flood, and until channels below are radically developed, the deficiency must be made from Joliet and Ottawa, or by steam auxiliaries." That the State will be powerless to install and operate steam auxiliaries will scarcely be denied. The above statements admitting a loss of head, and therefore of power and revenue, which even the added cubic feet of flow per second from the watershed cannot overcome, are based on the effect of flood waters, i. e., head waters. During the winter months, when the watershed is so frozen that the "run off" is small, ice gorges of greater or less height and duration are not at all infrequent. At such times the water shed will yield little water to compensate for the loss of head due to back water on the wheels. The picture (see cut, page 12, showing ice gorge) shown of the Illinois river at Bell's Island, two and a half miles below Marseilles, was taken from the left bank in 1903. The line of sight is down stream. It is exactly at this point that it is proposed to locate one of the State's power plants. The particular "ice spell" shown in the picture extended from LaSalle to Marseilles and lasted for nine consecutive weeks, during which time not one of the claimed total of 73,182 horse power would have been produced at the plants at Bell's Island or Utica. In May, 1911, Mr. Isham Randolph stated before the lower house of the Legislature that eight feet of head is required on turbines to properly produce electrical power. Records of the United States Engineers, of the Sanitary District of Chicago, and other reliable authorities, show that for varying periods the proposed plant at Utica would have been absolutely shut down from lack of head on its wheels as follows: 1883, 1890, 1892, 1900, 1902, 1903, 1904, 1907, 1908, 1909 and 1910. At other times during each of these years the head on the wheels at Utica would have varied from eight to ten feet for periods ranging into weeks. The

and affidavit made a profound impression on that body. I am free to admit that the photograph was probably taken at the place, at the time, and under the conditions as set forth in the subscribed and sworn statement. I deny that it has any bearing whatever upon the successful operation of the Bell's Island plant. Ice gorges form as this one did in bends of the river where the channel is shallow; the heavy ice lodges on the bottom and forms a dam against which all of the ice coming down the river lodges. As this dam is built up the river rises and more ice is piled up on the dam with the final effect that at times the channel is so gorged that the Marseilles plants suffer from back water. Now under the State plan this condition will not obtain, and if it did obtain it would not hinder the operation of the plant at Bell's Island. It might again, as it has done before back up water upon the Marseilles plants and impair the operation of their wheels. Ice gorges will not form, however, in a slack watered channel. The hydro-electric plant of the Sanitary District of Chicago at Lockport is typical of the plant which will be installed under the State plan at Bell's Island. The Sanitary District plant has never suffered from ice gorges. Ice gorges have not formed in the channel below, and the channel there is less than one-quarter as wide as the channel in the river at Bell's Island. In the upper basin at Joliet, before the channel was dredged to its present depth, ice gorges did form in the then shallow water and from time to time these had to be dynamited. Since this channel in the upper basin above dam No. 1 at Joliet has been deepened, ice gorges have never formed. Mr. Ward's photographic bugaboo may, therefore, frighten those who know nothing of the conditions; that it is a bugaboo, the successful operation of the Sanitary District power plant at Lockport throughout five consecutive winters will testify.

Mr. Ward's photographic bugaboo pales into insignificance when compared with the photograph of an ice gorge at the site of the Missis-

dam at Delbridge Island is expected to create 20 feet of head at the Utica power house, and yet for varying periods back water would have stood even above the crest of this dam as follows: In 1883, 1892, 1902, 1903, 1904, 1907 and 1909. During the rise of 1904 the water would have stood above the crest of that dam for several consecutive weeks. Such is the record at the power site where it is claimed that under a head of 20 feet, 31,818 horse power will be constantly produced.

Now as to the head that may be expected on the wheels at Bell's Island, where it is claimed that under a head of 26 feet, 41,364 horse power will be constantly produced. The plant at this site would have been shut down in 1883, 1903 and 1907. The records we have show that in certain other years the head would have been only 9.5 feet, 11.0 feet, 12.9 feet, 13.1 feet and 14.5 feet, instead of 26 feet, as claimed. And according to Mr. Randolph electrical power cannot be properly produced with less than eight feet of head.

It is greatly to be regretted that the records of water elevations over the stretch of river from Joliet to Utica are so few and incomplete. But certain it is that so far as the proposed plants at Bell's Island and Utica are concerned, only a fraction of the total claimed head can be depended upon to produce anything like continuous power. No more slope can be made use of than nature has placed in the stream. Only at points where the slope is sufficiently concentrated is it profitable to produce hydro-electric power. Excavation in the river between Marseilles and Utica will not lessen the ice gorge nuisance, for ice gorges form first below the Utica bridge and gradually back up stream, constantly increasing in height and extent. Even an increase of flow from Lake Michigan to 14,000 second feet will not push out the ice for it is held by ice at the toe of the slope near the Utica bridge. The ice at this toe can not be shoved down stream for the river below that point has a slope of only about an inch and a half per mile.

Mississippi River Power Company's plant at Keokuk, herewith presented. This view shows an enormous ice gorge on the very spot where the Mississippi River Power Company is spending about twenty million dollars in the construction of a hydro-electric power plant to develop two hundred thousand electrical horse power. All of this ice hasn't cooled the ardor of the engineers and capitalists who are back of this project.

Mr. Ward's assertion that in May, 1911, Mr. Isham Randolph stated before the lower House of the Legislature that eight feet of head is required on turbines to properly produce electrical power is not entirely correct. What Mr. Randolph did state was that electric power cannot be economically developed on heads of much less than eight feet.

The records of the United States and those of the Sanitary District of Chicago, and other reliable authorities, undoubtedly do show flood heights for the years enumerated in Mr. Ward's statement. That they show that the proposed plant at Utica would have been absolutely shut down from lack of head on its wheels on the dates mentioned, I deny; and that the same records show that the dam at Delbridge Island would be drowned out on the dates mentioned, I deny. I will not deny the records of flood heights in the river in its natural state, but I do deny that they can be twisted to show flood heights under changed conditions in a slack watered river.

I do not deny that the plant at Utica will be drowned out under certain flood conditions. The report of the Internal Improvement Commission so states, and Mr. Ward does well to quote Mr. Cooley who wrote that report. This eminent authority says: "The Utica power will always be affected by flood conditions in the river below. Such floods as those of 1883, 1892, and 1904 would reduce the head to between 10 and 12 feet, but such floods are exceptional.

Accepting Mr. Cooley as authority, as Mr. Ward has done, and admitting Mr. Randolph's statement that electrical power cannot be developed economically at heads of

It is not claimed that these extreme conditions will occur each and every consecutive year, but it is insisted that they may obtain any year and that the uncertainty as to when they will occur and how long they will last, together with the probability that almost each and every year the heads on the wheels will be affected to a greater or less extent, will render a large percentage of the claimed output intermittent and therefore of very little or no value. Only that portion of the power that is constant can be disposed of at a profitable price—the rest will be of little use to anyone. So far as the river between Marseilles and Utica is concerned, the power that can be depended upon at the proposed State plants will not exceed that which can be had on the Grand Rapids of the Illinois at Marseilles. And yet Mr. Cooley states that the plant to be placed between Marseilles and Ottawa and which at times will fail to produce the quota of power assigned to it, must turn out not only its own full quota but must make up a part of the shortage to be expected at Dresden and Utica. With such known physical conditions admitted by Mr. Cooley and the Internal Improvement Commission and more specifically proven by authentic water records, even with a flow of 14,000 second feet from Lake Michigan, would the State be warranted in guaranteeing to lessees, as constant, 100,000 horse power on the switchboards? And yet that is the amount of power that will be needed to keep faith with the people and return their money to the State treasury.

If the State would build a dam at Utica, 88 feet high, backing water to the Sanitary District power house, near the upper limits of Joliet, the theoretical head between those two points could be utilized so fully as possible and a fine water power would no doubt be created. However, the people of the State should have been told that this same amount of power cannot be produced when separated into four plants down streams that have the natural slopes of the DesPlaines and Illinois rivers. The physical

less than eight feet, I submit that the 10 to 12 feet of head which Mr. Cooley says would still be available at the Utica power even during such floods as those of 1883, 1892, and 1904 would still permit of a considerable development of hydro-electric power.

Mr. Ward makes the academic statement that "no more slope can be made use of than nature has placed in the stream." We will have to admit this, but I maintain that at Bell's Island we have made use of all of the slope nature has provided. To quote Mr. Cooley again: "Modern practice erects water power dams at the foot of rapids rather than at the head, and generally down stream as far as possible in order to mask the effect of floods." This is exactly what we have done in locating the State power plant at Bell's Island. The present power plant installations at Marseilles are at the head of the rapids and do not avail themselves of all the slope that nature has put in the stream and which can be made use of. Even now in an endeavor to increase the head at Marseilles and to take advantage of all the slope which nature has put in the stream, the Marseilles Land and Water Power Company and the Illinois Traction Company, its lessees, are digging a deeper tail race to discharge far enough down stream to give them the benefit of three feet additional head.

I will admit for the sake of argument that "excavations in the river between Marseilles and Utica will not lessen the ice gorge nuisance," but slack watering this stretch of the river and increasing the depth thereby will eliminate the ice gorge nuisance.

I again point to the successful operation of the Sanitary District plant at Lockport throughout five successive winters with entire freedom from "ice gorge nuisance" as proof of what the changed conditions created at Bell's Island by a slack watered river will produce.

It is comforting to note that Mr. Ward does not claim "that these extreme conditions will occur each and every consecutive year."

conditions are against the proposition that even with a flow of 14,000 second feet from Lake Michigan, the dream of a salable 100,000 horse power on the switchboards will ever be realized.

I will admit that they may obtain any year, but I will point out that the uncertainty as to when they will occur and how long they will last does not seem to have deterred Mr. Ward and his lessees, the Marseilles Hydraulic Company, from spending their stockholders' money in constructing a hydro-electric plant at Marseilles. Neither does it seem to have deterred the Marseilles Land and Water Power Company and its lessee, the Illinois Traction Company, from making extensive improvements in the plant on the north bank of the river. Fear of ice gorge nuisance and of impediments from back water does not seem to have deterred the Economy Light and Power Company from developing power at Joliet under a twenty year lease from the State. Fear of ice gorges and back water does not seem to have deterred the Economy Light and Power Company from attempting to build a dam for the development of hydro-electric energy at Dresden Heights. It appears to me that there must be some very peculiar condition in the laws of nature governing the flow of water in streams that makes it dangerous or impossible for the State to attempt to build a waterpower plant and sell electric energy when in the same river and at practically the same points a private enterprise seems to be able to build dams and develop hydro-electric energy for sale with impunity. Is it a law of nature, or is it the cupidity of human nature?

Mr. Ward states that "so far as the river between Marseilles and Utica is concerned, the power that can be depended upon at the proposed State plants will not exceed that which can be had on the Grand Rapids of the Illinois at Marseilles." In the light of the fact that the owners of the installations at the head of the Grand Rapids of the Illinois at Marseilles are bending every effort to increase the heads at these installations by the use of flash boards and by the expedient of extending the tail races, this statement is exceedingly amusing.

It is more amusing still to find Mr. Ward taking issue with Lyman E. Cooley. I hold no brief for Mr. Cooley, but I know that he has forgotten more about hydraulics than a great many very good engineers ever knew. Mr. Cooley's statement that the plant to be placed between Marseilles and Ottawa must turn out not only its own full quota but must make up a part of the shortage to be expected at Dresden and Utica is a statement that cannot be successfully questioned. The power plants proposed in the State plan are not separate and distinct installations, but four component parts of one installation. If one wheel in any one installation breaks down, the others carry the load. Just so the big public service corporations have numbers of plants scattered over their territories that all pump electricity into the trunk lines. No man can say where the power from each separate plant goes. Just so the four State power plants will all pump their juice into one line. When one plant fails on account of high water, back water, or ice conditions, it is not reasonable to suppose that all of the plants will fail at the same time. When one plant is out of commission for any one of a number of causes, the others collectively must supply the deficiency. Neither is it reasonable to suppose that all of these plants will receive their peak loads at the same moment. Anyone who knows anything about power plant economics knows that it is possible to sell an amount of electricity about fifty percent in excess of the total rated horse power of each plant simply for the reason that the use of all its power is not coincident; that it is compensating; that, for instance, when one man is using it another is not, and vice versa; that when two men are using it, one or two others are not, and vice versa. The same thing is true developed to the full ratio of the entire complement of power users of the plant.

Mr. Ward's fear that the State will not be able to deliver a constant 100,000 horse power on the switchboard and will not, there-

fore, be able to keep faith with the people and return their money to the State's treasury, is touching. If his interest in keeping profit for himself were not so apparent, his interest in keeping faith with the people would be more plausible. His self-abnegation is commendable.

This paragraph provokes my mirth. His statement that if the State would build a dam at Utica 88 feet high, backing water to the Sanitary District power house near the upper limits of Joliet, the theoretical head between those two points could be utilized so fully as possible and a fine waterpower would no doubt be created. He states, however, that this could not be done; that the same amount of power cannot be produced when separated into four plants down streams that have the natural slopes of the DesPlaines and Illinois rivers. The report of the Internal Improvement Commission expressly states that the total slope between Lockport and Utica, amounting to 10.4 feet had been subtracted from the total head of 98.4, and that the effective head will be 88 feet.

With Mr. Ward's own arithmetic I will deny him. On page 2 of the pamphlet he says to determine the horse power in the water column we have the formula $H.P. = \text{cubic feet of flow per second} \times \text{the head in feet} \times 0.11363$. If, in this case, we take the head in feet at 88, as he states, and the flow at 14,000 second feet, as he states, and substitute in the formula, we find that the total horse power produced is 139,992, which is 8 horse power short of the amount produced as figured in the four separate plants. I would not trust my own arithmetic for this complicated computation, but I am satisfied that Mr. Ward's formula cannot be at fault.

STATE'S POWER MORE EXPENSIVE THAN STEAM.

The fact is that all the salable power that can be produced on the Illinois river between Morris and LaSalle is concentrated at Marseilles on the Grand Rapids of the

The fact is not quite as Mr. Ward states it. The fact is that all the power that is developed at Marseilles is salable and that it finds a ready market within a stone's

Illinois. The constant power at Dresden Island will, probably, not exceed 75 per cent of that claimed, and it is possible, though scarcely probable, that the power at Brandon's Road may be 100 per cent of that claimed. It is highly improbable that the United States will permit more than 10,000 second feet to be drawn from Lake Michigan. Taking these figures into consideration, together with the heavy burden of interest, and including the expected "net profit of \$25.00 per horse power" the State's proposed electricity, when delivered to lessees on the switchboards will cost per horse power such a sum that, in this State, where fuel is so cheap it can not compete with electric power generated by steam in large quantities.

throw. It would not be worth the dam which the Marseilles Land and Water Power Company built to develop it if it was deprived of the artificial increment of flow sent down through the Sanitary District canal by the expenditure of \$66,000,000 of the people's money. This special privilege would not have developed a plant so expensive if it were not enjoying this artificial benefit which it paid not one dollar to create.

Mr. Ward says that it is possible, though hardly probable, that the Brandon's road power may be one hundred per cent of that claimed. This is merely Mr. Ward's unsupported opinion, and as such may be taken for what it is worth.

His statement of the probability of the amount of flow that would be permitted to be withdrawn from Lake Michigan bears the same qualification. It is not subscribed and sworn to, as is the photograph.

Mr. Ward says that in this State where fuel is so cheap the State power plant cannot compete with electric power generated by steam in large quantities. I do not know what special sources of information Mr. Ward has with regard to the development of electric power by steam, but I do know that nowhere can I find authentic figures of the cost of generating electric power by steam in large quantities cheaper than the same comparative quantities of electricity can be developed by hydraulic power. I shall be glad to find some authentic figures on the cost of steam electric production per kilowatt in large quantities in this State. The large public service companies are not particularly anxious to have such information made public. I maintain that this hydro-electric power, which it is proposed to develop in the DesPlaines and Illinois rivers between Lockport and Utica can compete with electric power generated by steam, even with the low cost of Illinois coal. Moreover, hydro-electric power is one of most effective conservation measures. Our supply of Illinois coal is not everlasting, and the more power

developed by hydraulic energy the less coal used and the longer the supply will be available. It will take about five pounds of Illinois coal to produce one horse power. If all of the water power we estimate available under the State plan were used for twenty-four hours a day 365 days in the year, there would be 876,000,000, horsepower units used. Multiplying this by 5 would give 4,380,000,000 pounds of coal. Divide this result by 2,000, and we have 2,190,000 tons. Estimating this coal at \$1.00 per ton, shows an annual saving on coal of \$2,190,000 which appears to justify the project as a conservation measure alone.

APPROVAL BY VOTERS IMPERILED.

It is true that the whole of the \$20,000,000 is not to be expended on the development of water power, yet whatever may be the amount of water power produced it must bear the full burden of paying the entire bond issue and interest, and after that has been done, turn into the State treasury not less than \$2,500,000 annually to "lessen the taxes of the taxpayers of this State." Let us again refer to the Governor's statements that the "constitutional amendment was submitted on the assumption that the water-power would pay for the waterway" and that the "invalidating of that assumption would greatly imperil, if it would not destroy the chance of its approval by the voters." The failure to produce a net annual revenue of \$2,500,000 for the State treasury, either because of inability to secure the necessary flow of 14,000 second feet from Lake Michigan, or of the failure of the claimed 88 feet of total available head to materialize, invalidates the assumption on which the constitutional amendment was submitted to the voters, just as truly as does the fact that the State does not possess the "undoubted right to the total water power available along the line of the proposed waterway."

I admit freely that whatever the amount of water power produced it must bear the full burden of paying the entire bond issue and interest. I admit further that the amount of water power produced depends almost entirely on the volume of flow available. As this volume is greater or less than the amount estimated, the annual revenue will be greater or less than the amount estimated. Nevertheless, it cannot be so much less that the entire twenty million dollar bond issue cannot be retired with interest within the twenty years.

The failure to produce a net annual revenue of \$2,500,000 for the State treasury on account of either of the possible variations in the conditions upon which the original estimate was predicated does not invalidate the assumption on which the constitutional amendment was submitted to the voters. Even with as small a flow as 10,000 cubic feet per second, the four plants can be made to pay an annual net revenue of \$2,000,000 and will retire the bonds with interest within the twenty year period.

It is not a fact that the State does not possess the undoubted right to the total water power available along the line of the proposed waterway. It has not been established as a fact, and our contention that the State owns the

artificial increment of flow still stands. Without this artificial increment of flow there is no water power of value, either to the State or to vested interests.

LESSEE WITHOUT RECOURSE.

When this waterway scheme was in embryo, the framers decided to limit the term of the power leases to ten years. While theoretically this may be a good idea, yet a prospective lessee may look askance at having the cost of his power revamped every ten years by "the boys." Again, there is absolutely no way for a lessee, be he a resident of this State or of another state, to compel Illinois to fulfill the covenants contained in a power lease. Should the State, for any reason whatever, fail to deliver the amount of power called for in a lease, the only recourse open to a citizen of this State would be to secure, if possible, an award for damages from our Court of Claims and, if successful, he must then resort to the uncertain method of lobbying to secure a special legislative appropriation to cover the award. If the lessee be a citizen of another state, perhaps in the Federal Courts he might obtain a judgment for damages against Illinois, but how could he collect the amount awarded? There is no authority vested in the General Government to enter a sovereign state and to levy and collect taxes to meet a judgment obtained for the failure of said state to comply with the terms of a water-power lease. Under such circumstances would not prospective bidders for electric power be wary about dealing with a party that could not be compelled to keep the terms of its agreement? Is it probable that large sums of money would be invested in manufacturing plants to be operated under short term power leases and with no security that the State will supply the power called for by the terms of the lease?

Here Mr. Ward and I are in full accord. Without discoursing upon the rights of the State's lessees and the protection of those rights, I am firmly of the opinion that the State should not lease any of this water power to any middle man to be retailed to the people for the profit of the middle man. My opinion is and always has been that the State should do what some of our opponents call going into the water power business; that the State should run these plants for profit that we should have municipal ownership of these plants, if you will. I do not accept the doctrine of municipal ownership universally, but I believe that in this instance State ownership and operation of these plants under the restrictions of the Civil Service Law should obtain. I am upheld in this belief by the successful operation of the Sanitary District of Chicago's municipally owned plant, and the large annual revenue which it returns to that municipality.

COST OF SIMILAR WORKS.

The first estimate of the cost of the Illinois and Michigan canal was \$600,000. It cost about \$8,000,000. The first estimate of the cost of the Hennepin canal was \$4,500,000, and it actually cost over \$7,000,000. The first estimate of the cost of the Panama canal was \$150,000,000, and the last Act of Congress made available \$500,000,000. The first estimate of the cost of the Chicago Drainage canal was about \$20,000,000; \$65,000,000 have been expended and the end is not yet. The first estimate of the cost of this proposed water-power waterway is \$20,000,000. Its ultimate cost is problematical.

I do not know what the first estimate of the Illinois and Michigan Canal was. I believe it is safe to assume that Mr. Ward is in error in his statement that the original estimate of its cost was \$600,000, because it is a fact that he is in error when he states that its final cost was \$8,000,000. As a matter of fact, the total amount expended in the construction of the Illinois and Michigan Canal from its beginning in 1836 until the deepening was completed, 1871, was \$9,869,981.85. The principal and interest due to bond holders and other evidences of canal indebtedness were extinguished on April 30, 1871. Instead of being a burden upon the taxpayers of the State, the canal paid its way. After its indebtedness was extinguished the canal continued to operate profitably and not until 1876 did the gross expenses exceed the tolls. At that time the business had outgrown the capacity of the canal and the railroads had waged relentless war upon it until it was finally forced out of business. For the purposes of argument I will admit that the first estimate of the cost of the Hennepin Canal was \$4,500,000 and that its actual cost was largely in excess of this amount. The canal was built at a cost of less than \$72,000 per mile, which is but little more than the face value per mile of the stocks and bonds of the Rock Island Railway that parallels it. The canal is physically capable of passing more freight per day than this adjacent double-track railway and passing it at a materially lower cost per ton mile. The trouble with the Hennepin Canal, as stated by an eminent authority, is that it "runs from the neck of the woods to the forks of the creek. It arrives nowhere, but ultimately as other waterway connections are made, and especially an adequate one from the Illinois river to Chicago, and as our density of population increases, the Hennepin Canal will serve a useful purpose. It is ahead of its time. If it served no other purpose, it has been worth

all that it cost and more in regulating freight rates upon the Rock Island and connecting railways."

In referring to the Panama Canal, Mr. Ward states that the first estimate of cost was \$150,000,000, and that something like \$500,000,000 has been appropriated for it. The fact is that the estimate of the advisory board of engineers, which made the plans and determined the type of canal, was in round numbers \$140,000,000. This applied to construction and engineering only, and did not include the \$40,000,000 paid the French Company, the \$10,000,000 paid to the government of Panama, and the enormous cost of sanitation and zone government. This estimate was for a canal of definite dimensions and certain plans. These plans have been altered and the dimensions greatly enlarged. For instance, the original plan called for a width of 200 feet through the great Culebra cut. That cut is being excavated to a width of 300 feet. This is only one of many changes which have been made, every one of which is adding to the cost of the work. The lock dimensions have also been enlarged and the cost consequently increased.

Referring to the Chicago Drainage Canal, Mr. Ward states that the first estimate of cost was about \$20,000,000. Mr. Ward was long employed by the Sanitary District of Chicago, and he should know that there was no comprehensive original estimate of the cost. Mr. Isham Randolph, for fourteen years Chief Engineer of the work, those fourteen years extending over the entire period of its construction, states that during his service as Chief Engineer he failed to find a comprehensive original estimate of cost. There was a gross estimate amounting to about \$18,000,000, covering the construction cost alone from Robey Street to Lockport only. This estimate did not include the cost of railway changes, cost of right-of-way, nor was there any item for administration or interest. The expenditures of the Sanitary District of Chicago are to

date about \$66,000,000. In this total is included right-of-way for the main channel, right-of-way for the north shore extension, part of the right-of-way for the Calumet-Sag extension, cost of railroad changes, controlling works, the extension from the controlling works to South Street in Joliet, water power extension and development, the Chicago River improvement, costing some \$10,000,000, cost of constructing the north shore channel, twenty years administration and interest on bonded indebtedness for a like period. The unit prices used in the early estimates were very nearly those obtained when the work was let. The partial estimate referred to was based upon a channel 16 feet deep in the earth and 18 feet in the rock. As built the channel is 24 feet deep throughout. Comparisons of the estimate of cost of the proposed State waterway with the estimate costs of the other channels referred to are designedly unfair. These comparisons do not go sufficiently into detail and the detailed investigation reveals the significant fact that in the case of the Sanitary District canal unit prices for which the work was done were very nearly equal the unit prices assumed in the estimate, and in the case of the Panama Canal the unit prices at which the work was estimated are far in excess of the actual unit costs for which the work is being done.

EACH COUNTY'S SHARE OF COST.

The Internal Improvement Commission has admitted that interest to the amount of \$4,800,000 will accumulate during the period of construction. This will make the total debt, at the close of construction \$24,800,000. Based on assessed values for the year 1910, as fixed by the State Board of Equalization and assuming that the work can be completed for a total of \$24,800,000, the following is the share of the above named sum that must be paid by the taxpayers of the counties named:

I take issue with Mr. Ward's statement that the Internal Improvement Commission has admitted that interest amounting to \$4,800,000 will accumulate during the period of construction. The statement referred to is contained in the prospectus which we sent out in the campaign for the bond issue. The statement was written by me and is as follows:

"Assuming that the entire issue was sold at the start \$800,000 per annum must be paid for interest at 4 per cent * * *. On this basis

Adams	\$ 251,242	11
Alexander	62,683	74
Bond	56,473	97
Boone	87,894	73
Brown	40,380	41
Bureau	250,802	58
Calhoun	25,627	98
Carroll	103,334	63
Cass	96,809	30
Champaign	332,386	11
Christian	192,581	76
Clark	88,672	36
Clay	53,115	51
Clinton	64,092	49
Coles	134,135	54
Cook	10,321,787	28
Crawford	96,809	30
Cumberland	56,834	61
DeKalb	210,568	68
DeWitt	108,563	91
Douglas	118,075	09
DuPage	161,814	66
Edgar	175,676	76
Edwards	34,891	92
Effingham	69,682	41
Fayette	99,435	21
Ford	147,659	54
Franklin	60,734	03
Fulton	183,227	65
Gallatin	31,747	59
Greene	100,291	73
Grundy	132,061	86
Hamilton	42,127	26
Hancock	160,698	93
Hardin	10,109	19
Henderson	76,365	52
Henry	226,267	79
Iroquois	296,367	19
Jackson	72,556	26
Jasper	59,809	89
Jefferson	64,024	87
Jersey	51,323	58
JoDaviness	116,779	74
Johnson	32,266	01
Kane	382,098	08
Kankakee	169,782	55
Kendall	74,911	69
Knox	226,650	97
Lake	215,504	94
LaSalle	431,122	58
Lawrence	83,814	99
Lee	203,536	20
Livingston	324,677	43
Logan	190,902	53
Macon	236,162	85
Macoupin	168,328	72
Madison	311,976	14
Marion	77,875	70
Marshall	105,960	54
Mason	83,645	94

there would be advanced by the State in the six years before the plants began to show earnings \$4,800,00 on the bonds * * *. This presents the case in its most unfavorable aspect."

This ridiculous assumption was made with the express purpose of presenting the case in its most unfavorable aspect, in order to present it to the voters in its most conservative light. Anyone who assumes that the entire issue of bonds would actually be sold at the outset does so either through densest ignorance or through a deliberate intention to misrepresent the facts. The facts are that the bonds will not be sold in a lump when their issuance is authorized, but that they will be issued from time to time as the money is needed. The major expenditure will come in the last three years and at the close of the work. The net interest account, therefore, based on the probable distribution of expenditures during the six years of construction would be between \$1,600,000 and \$1,700,000. It will be practical to complete one or two of the power plants and begin selling power before the whole work is completed. It also will be practicable to defer part of the cost of constructing the locks until after the earnings have begun. It will then be seen that any contingency which might affect the cost of the work may be met without increasing the bond issue authorized.

Mr. Ward's tabulation of the amount that must be paid by the taxpayers of each of the counties in the State, based upon his willfully distorted statement of the total indebtedness, is not at all germane to the discussion. The people of the State and of each county are merely asked to lend their credit for three or four years of the period of construction. In three years after the work is started it will begin to return revenue and before it is completed the revenue from the power plants alone will take care of the interest on the bonds and provide for their amortization.

Massac	\$ 31,364 41
McDonough	154,939 96
McHenry	178,821 09
McLean	445,638 34
Menard	79,847 95
Mercer	123,958 73
Monroe	51,582 79
Montgomery	159,628 28
Morgan	183,633 38
Moultrie	81,189 08
Ogle	208,483 73
Peoria	404,018 23
Perry	51,470 09
Piatt	130,326 28
Pike	110,603 78
Pope	20,409 97
Pulaski	26,473 23
Putnam	34,643 98
Randolph	79,633 82
Richland	49,418 95
Rock Island	216,237 49
Saline	57,240 33
Sangamon	439,755 40
Schuyler	60,012 75
Scott	52,991 54
Shelby	156,427 60
Stark	73,345 16
St. Clair	373,251 13
Stevenson	175,079 45
Tazewell	194,869 57
Union	46,161 92
Vermilion	385,197 33
Wabash	47,998 93
Warren	162,930 39
Washington	53,960 76
Wayne	73,153 57
White	62,897 87
Whiteside	188,456 94
Will	339,970 82
Williamson	110,265 68
Winnebago	324,936 64
Woodford	144,357 43
Total	\$24,791,329 00

FINANCIAL PROBLEM CONFRONTING PEOPLE.

The problem that now actually confronts the people of Illinois is the purchase of all water-power rights. Those at Dresden, owned by the Economy Light & Power Company, are estimated by the Internal Improvement Commissioners to be over 28,000 horse-power, and the holdings of the same company at Hickory Creek are about 14,000 horse power. In his message of November 6, 1907, Governor Deen says: "The value of this

Mr. Ward states that the problem now actually confronting the people is the purchase of all the water power rights along the river. This is not true. Considering the alleged water power rights referred to seriatim: we do not believe that the Economy Light and Power Company has a water power at Dresden Heights. Even if it was entitled to the artificial increment of flow from the Drainage Canal, there are lands within the pool

power is variously estimated at from \$400 to \$500 per horse power." Therefore, the Economy Light & Power Company's holdings must be worth from \$16,800,000 to \$21,000,000. The power at Marseilles should be valued on a basis of 24,900 horse power (see page 51 of report of Internal Improvement Commission, 1909, in connection with page 3 of the Governor's message of November 6, 1907). Applying the values per horsepower stated above, this property must be worth from \$9,960,000 to \$12,450,000 and the total value of these two properties, according to the eminent authorities quoted, must be from \$26,760,000 to \$33,450,000.

It is inconceivable that a jury could be found which would give the riparian owners a verdict for a smaller sum than values the State authorities have themselves placed upon the property. No one would contend that the State could take private property, which private individuals are using in their private business, for the purpose of conducting that same business with that same property, without the private owners receiving from the State full value therefor.

which will be formed by the company's dam at this point and which will be flooded, which do not belong to the company. It cannot flood these lands if it does not possess them, it has no power of condemnation and, therefore, cannot acquire them. Mr. Ward's assertion that the Internal Improvement Commission estimated that the Economy Light and Power Company owned over 28,000 horse power at this point is a deliberate misstatement. The Internal Improvement Commission never estimated what amount of power was owned or claimed to be owned by the Economy Light and Power Company at this point. Our estimates for power development at Dresden Heights were based upon a much higher head than the dam which is proposed by the Economy Light & Power Company, and the State dam is to be located about a mile down stream beyond the designated location of the Economy Light & Power Company dam.

The alleged water power rights of the same Company at Hickory Creek, which Mr. Ward states amounts to 14,000 horse power, are not so well established. The company has no water power and cannot have any water power at this point without joining its dam onto the banks and land of the Illinois and Michigan Canal. It has not been granted any right by the Canal Commission to connect its dam to these lands. It cannot acquire the right to do this for a period of more than twenty years. Assuming that it could complete the dam by reason of consummating some such agreement with the Canal Commission, it still could not fill the pool created by the dam because that would flood land which does not belong to the company and which it cannot acquire because it has not the right of eminent domain.

When Governor Deneen stated that "the value of this power is variously estimated at \$400 to \$500 per horse power, he made the statement upon the advice of the Internal Improvement Commission. I believe now that these values are

too low; that in the light of the cases referred to by Mr. Ward in this footnote and in the light of values revealed for other water power plants that complete hydro-electric developments in this section of the river as going concerns have a value more nearly approaching \$1,000 per horse power. Mr. Ward's reflections upon jury awards are immaterial. He cannot succeed in giving fictitious values to water power right that do not exist.

CONCLUSION.

The inevitable conclusion follows that, if the State takes possession of the water power rights of private individuals, nothing can be accomplished with the \$20,000,000 toward the construction of the waterway. However, for the \$20,000,000 a waterway, after the plans of the United States engineers can be built from Joliet to Utica, provided the State leaves private owners in possession of their private property, as do the plans of the United States for a waterway down the valley. The idea of the government or of the State developing and distributing hydro-electric energy is so foreign to the universal conception of the proper functions of government that the inability to do so should be regarded as fortunate. The State should confine the use of its powers to governmental purposes.

EBIN J. WARD.

The inevitable conclusion follows that if the State takes possession of the water power that is hers by right of having bought and paid for it with her people's money; and if vested interests do not succeed in filching from the State the water power paid for with the people's money, the waterway from Lockport to Utica will be built, an enormous carrying trade will be developed through the waterway, a thriving industrial territory will spring up by reason of the waterway, and cheap power; the cost of the waterway will be paid back from the proceeds of the water power, and the State will reap the benefit of a perpetual annual revenue.

ROBERT ISHAM RANDOLPH.

UNIVERSITY OF ILLINOIS-URBANA



3 0112 112905465